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Richard S. Falk and **Ragnar Winther*** (`ragnar.winther@cma.uio.no`). *Local bounded cochain projections*. Preliminary report.

We construct projections from $H\Lambda^k(\Omega)$, the space of differential k forms on Ω which belong to $L^2(\Omega)$ and whose exterior derivative also belongs to $L^2(\Omega)$, to finite dimensional subspaces of $H\Lambda^k(\Omega)$ consisting of piecewise polynomial differential forms defined on a simplicial mesh of Ω . Thus, their definition requires less smoothness than assumed for the definition of the canonical interpolants based on the degrees of freedom. Moreover, these projections have the properties that they commute with the exterior derivative and are bounded in the $H\Lambda^k(\Omega)$ norm independent of the mesh size h . Unlike some other recent work in this direction, the projections are also locally defined in the sense that they are defined by local operators on overlapping macroelements, in the spirit of the Clément interpolant. (Received September 24, 2012)